

CLAIMS

What is claimed is:

1. A method for modifying the viscosity of pureed vegetable matter, said method including the step of applying relatively low-frequency ultrasonic energy (having a frequency in the range from about 16 kHz to 100 kHz) to said puree via a sonotrode in a manner such that cavitation of a water fraction in said puree is induced, and the cellular structure and cell wall material of the vegetable matter are degraded, thereby to increase the viscosity of said puree.
2. The method of claim 1, wherein the application of the ultrasonic energy to said pureed vegetable matter is effected via a sonotrode inserted directly into said pureed vegetable matter.
3. The method of claim 2, wherein the sonotrode is a high-intensity sonotrode arranged to deliver an energy intensity equal to, or greater than, 1 W/cm^3 .
4. The method of any preceding claim, wherein the sonotrode is arranged to deliver ultrasound waves having an amplitude of between 1 and 500 micron.
5. The method of claim 4, wherein the sonotrode is a radial sonotrode.
6. The method of claim 4, wherein the sonotrode is a focused sonotrode.
7. The method of any one preceding claim, further including: providing an automatic frequency scanning system in conjunction with said sonotrode; actuating said automatic frequency scanning system to scan said puree for an ultrasonic resonance frequency, being the frequency at which said puree will support a standing

wave of ultrasonic energy; and adjusting the ultrasonic wave frequency delivered by the sonotrode to the puree to match said ultrasonic resonance frequency.

8. The method of any one preceding claim, wherein said vegetable puree is made up at least partly of tomato puree, said tomato puree preferably containing between 4°Brix and 36°Brix net total tomato solids.
9. The method of claim 8, wherein the tomato puree concentration is in the range of 12°Brix to 36°Brix.
10. The method of claim 8 or 9, wherein said puree is heated to a temperature in the range 65° C to 80° C prior to the application of the ultrasonic energy.
11. The method of claim 8, 9 or 10, wherein said puree is introduced to said sonotrode under an overpressure of between 0.1 Bar and 10 Bar.
12. The method of any one preceding claim, wherein the puree is processed to have up to 25 % by mass of sugar, in order to assist in stabilizing the viscosity of the puree post-ultrasonic treatment.
13. A vegetable puree produced by a method as defined in any preceding claim.
14. Apparatus for increasing the viscosity of pureed vegetable matter, via the application of relatively low-frequency ultrasonic energy to said puree, including: a bath, trough, chamber, pipe, flow cell or similar vessel arranged for containing or transporting said puree in a food processing plant; and a sonotrode arranged to deliver ultrasonic energy, with a frequency in the range from about 16 kHz to 100 kHz, to said puree in such manner as to induce cavitation of

a water fraction in said puree and degrade the cellular structure and the cell wall material of the vegetable matter.

15. The apparatus of claim 14, wherein said sonotrode is arranged to be in direct contact with said pureed vegetable matter.
16. The apparatus of claim 15, wherein the sonotrode is a high-intensity sonotrode arranged to deliver an energy intensity equal to, or greater than, 1 W/cm^3 .
17. The apparatus of any one of claims 14 to 16, wherein the sonotrode is arranged to deliver ultrasound waves having an amplitude of between 1 and 500 micron.
18. The apparatus of claim 17, wherein the sonotrode is a radial sonotrode.
19. The apparatus of any of claims 14 to 18, further including: an automatic frequency scanning system arranged to scan said puree for ultrasonic resonance frequency, being the frequency at which said puree will support a standing wave of ultrasonic energy; and means for adjusting the ultrasonic wave frequency delivered by the sonotrode to match said ultrasonic resonance frequency.
20. The apparatus of any one of claims 14 to 19, wherein the sonotrode is manufactured from one or more materials selected from the group consisting of titanium, aluminum, steel, hastalloy, ceramic and glass.
21. The retrofitting of a sonotrode arranged to deliver ultrasonic energy having a frequency in a range from about 16 KHz to 100 KHz, to a bath, trough, chamber, pipe, flow cell or other vessel capable of containing or transporting a vegetable puree, for use in modifying the viscosity of said puree upon application of said ultrasonic energy to said puree.